IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Morton M. MOWER

Appln. No.: **10/053,750**

Filed: Jan. 21, 2002 Group Art Unit: 3762

Conf. No.: 6121 Examiner: Getzow, S.M.

For: AUGMENTATION OF ELECTRICAL CONDUCTION AND CONTRACTILITY BY BIPHASIC CARDIAC PACING ADMINISTERED VIA THE BLOOD POOL

REQUEST FOR INTERFERENCE UNDER 37 C.F.R. § 41.202

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

A. Status of Claims

Claims 12-14, 18-20, 22, and 58-66 are currently pending in the application. Claims 15, 17, 24-25, 34-36, 38, 47, and 50 have been canceled since the previous request. Applicant respectfully requests declaration of an interference in accordance with 37 C.F.R. § 41.202. The reasons for granting this request follow.

B. Identification of Patents

In accordance with 37 C.F.R. § 41.202(a)(1), Applicant identifies U.S. Patent No. 6,233,484 (hereinafter the '484 Patent) and U.S. Patent No. 6,463,324 (hereinafter the '324 Patent).

C. Proposed Count 1 for Interference

In accordance with 37 C.F.R. § 41.202(a)(2), Applicant proposes the following Count 1 directed to an apparatus for treatment of cardiac muscle:

COUNT 1

Apparatus comprising:

circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle; and

comprising circuitry for controlling the start time and/or duration of the electric current flowing between said at least two points which is synchronized to heart activity, said circuitry not operating at every beat of the heart.

C.1. Correspondence of Patent Claims to Proposed Count 1

In accordance with 37 C.F.R. § 41.202(a)(2), Applicant identifies that claims 1, 4, 46-50 and 52 of the '484 Patent correspond to proposed Count 1. This correspondence is explained as follows.

Independent claims 1, 4, and 46-50 of the '484 Patent correspond to proposed Count 1, although they are not exact duplicates thereof.

One difference between independent claim 1 and proposed Count 1 is that claim 1 recites that the "circuitry for controlling the start time and/or the duration of the electric potential" is a part of the "circuitry for creating a non-excitatory electric potential," whereas proposed Count 1 recites these as two separate structures. There is little meaningful difference between these two descriptions of the invention since the same limitations are recited in each, albeit organized slightly differently. This is not a difference of patentable distinction.

Another difference between independent claim 1 and proposed Count 1 is that claim 1 recites "controlling the start time and/or the duration of the electric potential generated between" two points, whereas proposed Count 1 recites "controlling the start time and/or duration of the electric current flowing between" two points (emphasis added by underlining to show contrasting language). As a matter of physics, the start time and duration aspects of the current and the electrical potential in this context are synonymous. In the biomedical context in which this invention operates, there would not be anything to cause the current and potential to be shifted or stretched with respect to one another in any meaningful way.

The only difference between independent claim 4 and proposed Count 1 is that claim 4 recites in its preamble that the apparatus is "for selectively and reversibly reducing the oxygen consumption of an area of a muscle," whereas proposed Count 1 is silent as to what the apparatus is to be used for. This is merely a recitation of an intended use of the apparatus and does not materially limit the apparatus claim in any structural manner. It is noted that the recited purpose of reducing oxygen consumption is not mentioned in the body of the claim and, thus, the material limitations of the claim do not breathe life and meaning into the purpose recitation in the preamble. (See, MPEP §2111.02; 8th Ed., Rev. 3.)

The only difference between independent claim 46 and proposed Count 1 is that claim 46 recites in its preamble that the apparatus is "for performing heart surgery," whereas proposed Count 1 is silent as to what the apparatus is to be used for. Applicant submits that the text at issue is merely a recitation of an intended use of the apparatus and does not materially limit the claim. It is noted that the recited purpose of surgery is not mentioned in the body of the claim and, thus, the material limitations of the claim do not breath life and meaning into the purpose recitation in the preamble. (See, MPEP §2111.02; 8th Ed., Rev. 3.)

One difference between independent claims 47-50 and proposed Count 1 is that the "circuitry for controlling the start time and/or the duration of the electric potential" is a part of the "circuitry for creating a non-excitatory electric potential," whereas proposed Count 1 recites these as two separate structures. There is little meaningful difference between these two descriptions of the invention since the same limitations are recited in each, albeit organized slightly differently. This is not a difference of patentable distinction.

Another difference between independent claim 47 and proposed Count 1 is that claim 47 recites in its preamble that the apparatus is "for promoting the healing of the hibernated area of the cardiac muscle after myocardial infarct," whereas proposed Count 1 is silent as to what the apparatus is to be used for. This is merely a recitation of an intended use of the apparatus and does not materially limit the claim. It is noted that the recited purpose of promoting healing is not mentioned in the body of the claim and, thus, the material limitations of the claim do not breath life and meaning into the purpose recitation in the preamble. (See, MPEP §2111.02; 8th

Ed., Rev. 3.)

Another difference between independent claim 48 and proposed Count 1 is that claim 48 recites in its preamble that the apparatus is "for promoting the healing of an ischemic area of the cardiac muscle," whereas proposed Count 1 is silent as to what the apparatus is to be used for. This is merely a recitation of an intended use of the apparatus and does not materially limit the claim. It is noted that the recited purpose of promoting healing is not mentioned in the body of the claim and, thus, the material limitations of the claim do not breath life and meaning into the purpose recitation in the preamble. (See, MPEP §2111.02; 8th Ed., Rev. 3.)

Another difference between independent claim 49 and proposed Count 1 is that claim 49 recites in its preamble that the apparatus is "for treating congenital or acquired hypertrophic cardiomyopathy," whereas proposed Count 1 is silent as to what the apparatus is to be used for. This is merely a recitation of an intended use of the apparatus and does not materially limit the claim. It is noted that the recited purpose of treating hypertrophic cardiomyopathy is not mentioned in the body of the claim and, thus, the material limitations of the claim do not breath life and meaning into the purpose recitation in the preamble. (See, MPEP §2111.02; 8th Ed., Rev. 3.)

Another difference between independent claim 50 and proposed Count 1 is that claim 50 recites in its preamble that the apparatus is "for aiding in performing cardiac ablation," whereas proposed Count 1 is silent as to what the apparatus is to be used for. This is merely a recitation of an intended use of the apparatus and does not materially limit the claim. It is noted that the recited purpose of aiding cardiac ablation is not mentioned in the body of the claim and, thus, the material limitations of the claim do not breath life and meaning into the purpose recitation in the preamble. (See, MPEP §2111.02; 8th Ed., Rev. 3.)

Dependent claim 52 of the '484 Patent also corresponds to proposed Count 1. This dependent claim describes is greater detail various aspects of the same invention to which proposed Count 1 is directed.

The correspondence of independent claims 1, 4, 46-50 and 52 of the '484 Patent to proposed Count 1 is set out in tabular form in **Attachment A**.

C.2. Correspondence of Application Claims to Proposed Count 1

In accordance with 37 C.F.R. § 41.202(a)(2), Applicant identifies that claims 12 and 14 of this application correspond to proposed Count 1. This correspondence is explained as follows.

Independent claims 12 and 14 of the present application correspond to proposed Count 1, although they are not exact duplicates thereof.

One difference between independent claim 12 and proposed Count 1 is that claim 12 recites that the "circuitry for controlling the start time and/or the duration of the electric potential" is a part of the "circuitry for creating a non-excitatory electric potential," whereas proposed Count 1 recites these as two separate structures. There is little meaningful difference between these two descriptions of the invention since the same limitations are recited in each, albeit organized slightly differently. This is not a difference of patentable distinction.

Another difference between independent claim 12 and proposed Count 1 is that claim 12 recites "controlling the start time and/or the duration of the electric potential generated between" two points, whereas proposed Count 1 recites "controlling the start time and/or duration of the electric current flowing between" two points (emphasis added to show contrasting language). As a matter of physics, the start time and duration aspects of the current and the electrical potential in this context are synonymous. In the biomedical context in which this invention operates, there would not be anything to cause current and potential to be shifted or stretched with respect to one another in any meaningful way.

A final difference between claim 12 and proposed Count 1 is that instead of including a limitation of "said circuitry not operating at every beat of the heart," claim 12 includes the limitation of "said non-excitatory electric potential being a first phase of a biphasic pacing pulse." However, Applicant submits that "demand pacing," in which pacing is done only as demanded or needed instead of at every beat of the heart (and thus "not at every beat of the heart") was well known in the pacemaker art as of 1996 and that it would have been obvious to modify Applicant's invention to apply Applicant's pacing invention to demand pacing pacemakers. As such, it renders the subject matter obvious, as required by 37 C.F.R. 41.203(a).

A difference between independent claim 14 and proposed Count 1 is that claim 14 recites

in its preamble that the apparatus is "for varying conduction velocity of a muscle," whereas proposed Count 1 is silent as to what the apparatus is to be used for. This is merely a recitation of an intended use of the apparatus and does not materially limit the claim. It is noted that the recited purpose is not mentioned in the body of the claim and, thus, the material limitations of the claim do not breath life and meaning into the purpose recitation in the preamble. (See, MPEP §2111.02; 8th Ed., Rev. 3.)

A final difference between claim 14 and proposed Count 1 is that instead of including a limitation of "said circuitry not operating at every beat of the heart," claim 14 includes the limitation of "said non-excitatory electric potential being a first phase of a biphasic pacing pulse." However, Applicant submits that "demand pacing," in which pacing is done only as demanded or needed instead of at every beat of the heart (and thus "not at every beat of the heart") was well known in the pacemaker art as of 1996 and that it would have been obvious to modify Applicant's invention to apply Applicant's pacing invention to demand pacing pacemakers. As such, it renders the subject matter obvious, as required by 37 C.F.R. 41.203(a).

The correspondence of independent claims 12 and 14 of this application to proposed Count 1 is set out in tabular form in **Attachment B**.

C3. Comparison to Show Interference in Accordance with 37 CFR 41.202(a)(3)

Attachment N sets forth the required comparisons to show Interference in accordance with 37 CFR 41.202(a)(3).

C4. Applicant will Prevail on Priority

This application is a continuation of U.S. Patent no. 6,341,235 (herein, the '235 Patent) filed October 18, 2000, which is a continuation-in-part of U.S. Patent no. 6,136,019 (herein, the '019 Patent) filed January 16, 1998, which is a continuation-in-part of U.S. patent U.S. Patent no. 5,871,506 filed August 19, 1996 (herein, the '506 Patent). The applications giving rise to the patents in the priority chain of the present application have been incorporated by reference into the application, in their entirety, for all purposes. Additionally, the priority claim of the '235 Patent claims priority from the '019 Patent. The priority claim of the '019 Patent claims priority from the '506 Patent.

Applicant will prevail on priority under 37 C.F.R. 41.202(a)(4) since Applicant's claims can claim an earlier priority date of August 19, 1996, whereas the earliest possible priority date that can be claimed in the patents is September 16, 1996. **Attachment P** demonstrates continuous support for the claims of the present application through the priority chain in accordance with 37 CFR §§41.202(a)(5) and (a)(6).

D. Proposed Count 2 for Interference

In accordance with 37 C.F.R. § 41.202(a)(2), Applicant proposes the following Count 2 directed to causing non-excitatory electric current to flow between points located in the vicinity of the heart:

COUNT 2

Implantable apparatus comprising:

circuitry for causing a non-excitatory electric current to flow between at least two points located in the vicinity of a muscle; and

circuitry for controlling the start time and/or duration of the electric current, wherein said circuitry for controlling does not operate at every beat of the heart.

D.1. Correspondence of Patent Claims to Proposed Count 2

In accordance with 37 C.F.R. § 41.202(a)(2), Applicant identifies that claim 2 of the '484 Patent corresponds to proposed Count 2. This correspondence is explained as follows.

Independent claim 2 of the '484 Patent corresponds exactly to proposed Count 2. The correspondence of independent claim 2 of the '484 Patent to proposed Count 2 is set out in tabular form in **Attachment C**.

D.2. Correspondence of Application Claims to Proposed Count 2

In accordance with 37 C.F.R. § 41.202(a)(2), Applicant identifies that claim 13 of this application corresponds to proposed Count 2. This correspondence is explained as follows.

Independent claim 13 of the present application corresponds closely to proposed Count 2, although it is not an exact duplicate thereof. The difference between claim 13 and proposed

Count 2 is that instead of including a limitation of "said circuitry for controlling does not operate at every beat of the heart," claim 13 includes the limitation of "said non-excitatory electric current is a first phase of a biphasic pacing pulse." However, Applicant submits that "demand pacing," in which pacing is done only as demanded or needed instead of at every beat of the heart (and thus "not at every beat of the heart") was well known in the pacemaker art as of 1996 and that it would have been obvious to modify Applicant's invention to apply Applicant's pacing invention to demand pacing pacemakers. As such, it renders the subject matter obvious, as required by 37 C.F.R. 41.203(a).

The correspondence of independent claim 13 of the application to proposed Count 2 is set out in tabular form in **Attachment D**.

D.3. Comparison to Show Interference in Accordance with 37 CFR 41.202(a)(3)

Attachment N sets forth the required comparisons to show Interference in accordance with 37 CFR 41.202(a)(3).

D.4. Applicant will Prevail on Priority

This application is a continuation of U.S. Patent no. 6,341,235 (herein, the '235 Patent) filed October 18, 2000, which is a continuation-in-part of U.S. Patent no. 6,136,019 (herein, the '019 Patent) filed January 16, 1998, which is a continuation-in-part of U.S. patent U.S. Patent no. 5,871,506 filed August 19, 1996 (herein, the '506 Patent). The applications giving rise to the patents in the priority chain of the present application have been incorporated by reference into the application, in their entirety, for all purposes. Additionally, the priority claim of the '235 Patent claims priority from the '019 Patent. The priority claim of the '019 Patent claims priority from the '506 Patent.

Applicant will prevail on priority under 37 C.F.R. 41.202(a)(4) since Applicant's claims can claim an earlier priority date of August 19, 1996, whereas the earliest possible priority date that can be claimed in the patents is September 16, 1996. **Attachment P** demonstrates continuous support for the claims of the present application through the priority chain in

accordance with 37 CFR §§41.202(a)(5) and (a)(6).

E. Proposed Count 3 for Interference

In accordance with 37 C.F.R. § 41.202(a)(2), Applicant proposes the following Count 3 directed to a method that causes a non-excitatory electric current to flow between points located in the vicinity of a muscle:

COUNT 3

A method for varying the contraction force of a muscle, comprising:

causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle; and

controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points.

E.1. Correspondence of Patent Claims to Proposed Count 3

In accordance with 37 C.F.R. § 1.607(a)(3), Applicant identifies that claims 8, 9/8, 10-12, 16, 17/16, 18/16, 20, 21, 24, 26-29, 32/16, 32/20, 32/21, and 32/24 of the '484 Patent correspond to proposed Count 3. This correspondence is explained as follows.

Independent claims 8, 16, 20, 21, 24, and 26 of the '484 Patent correspond to proposed Count 3 although they are not exact duplicates thereof.

The only difference between claim 8 and proposed Count 3 is that claim 8 recites "for reducing the contraction force of a muscle" in the preamble whereas Count 3 is for "varying the contraction force." One difference between claim 16 and proposed Count 3 is that claim 16 recites "reducing the contraction force of a treated area of the cardiac muscle" and to "obtain the desired reduction in muscle contraction at the treated heart area." One difference between claim 20 and proposed Count 3 is the recitation of the "electric current being of an intensity and polarity suitable to obtain the desired reduction in muscle contraction at the affected heart area." One difference between claim 24 and proposed Count 3 is that claim 24 recites "reducing the contraction force of the heart muscle" and the "electric current being of an intensity and polarity

suitable to obtain the desired reduction in muscle contraction." One difference between claim 26 and proposed Count 3 is that claim 26 recites "reducing the contraction force of the area of the cardiac muscle" and "thereby to obtain the desired reduction in muscle contraction at the heart area."

The only difference between claim 21 and proposed Count 3 is the recitation of "for selectively and reversibly reducing the oxygen consumption of an area of a muscle" in the preamble, and of the "electric current being of an intensity and polarity suitable to obtain the desired reduction in oxygen consumption at the affected heart area."

Another difference between claim 16 and proposed Count 3 is that claim 16 recites "for performing heart surgery" and the step of "thereafter performing surgery thereon." It is noted that only a cursory recitation is made to any surgery in the method and that the claim is really directed to a method of *preparing* to perform surgery. That is simply an intended purpose of the method and does not amount to a patentably distinct limitation. (See, MPEP §2111.02; 8th Ed., Rev. 3.)

Another difference between claim 20 and proposed Count 3 is that claim 20 recites "promoting the healing of the cardiac muscle after myocardial infarct." The promotion of cardiac muscle healing is simply an inherent result of the recited method steps and, thus, is not a patentably distinct limitation.

Another difference between claim 24 and proposed Count 3 is that claim 24 recites "for treating congenital or acquired hypertrophic cardiomyopathy" in the preamble. Any utility this method may have in treatment of hypertrophic cardiomayopathy is simply an inherent result of the recited method steps and, thus, is not a patentably distinct limitation.

Another difference between claim 26 and proposed Count 3 is that claim 26 recites "for performing cardiac ablation" in the preamble and the step of "thereafter performing the ablation thereon." It is noted that only a cursory recitation is made to any ablation in the method and that the claim is really directed to a method of *preparing* to perform cardiac ablation. That is simply an intended purpose of the method and does not amount to a patentably distinct limitation. (See, MPEP §2111.02; 8th Ed., Rev. 3.)

The correspondence of independent claims 8, 16, 20, 21, 24, and 26 of the '484 Patent to proposed Count 3 is set out in tabular form in **Attachment E**.

Dependent claims 9/8, 10-12, 17/16, 18/16, 27-29, 32/16, 32/20, 32/21, and 32/24 of the '484 Patent also correspond to proposed Count 3. That is because these dependent claims describe in greater detail various aspects of the same invention to which proposed Count 3 is directed.

E.2. Correspondence of Application Claims to Proposed Count 3

In accordance with 37 C.F.R. § 41.202(a)(2), Applicant identifies that claims 18, 19/18, 20, and 22 of this application correspond to proposed Count 3. This correspondence is explained as follows.

Independent claim 18 of the present application corresponds to proposed Count 3 although it is not an exact duplicate thereof.

One difference between claim 18 and proposed Count 3 is that claim 18 recites "for varying conduction velocity of a muscle" in the preamble instead of "varying the contraction force." As illustrated in figures 6 and 7, varying the conduction velocity can be done based on timing. The conduction velocity inherently affects the contraction force, thus varying (and inherently including reducing) contraction force. Another difference between claim 18 and proposed Count 3 is that claim 18 claims the non-excitatory current flow "as a first phase of a bi-phasic stimulation pulse."

The correspondence of independent claims 18 of the present application to proposed Count 3 is set out in tabular form in **Attachment F**.

Dependent claims 19/18, 20 and 22 of the present application also correspond to proposed Count 3. That is because these dependent claims describe in greater detail various aspects of the same invention to which proposed Count 3 is directed.

E.3. Comparison to Show Interference in Accordance with 37 CFR 41.202(a)(3)

Attachment N sets forth the required comparisons to show Interference in accordance

with 37 CFR 41.202(a)(3).

E.4. Applicant will Prevail on Priority

This application is a continuation of U.S. Patent no. 6,341,235 (herein, the '235 Patent) filed October 18, 2000, which is a continuation-in-part of U.S. Patent no. 6,136,019 (herein, the '019 Patent) filed January 16, 1998, which is a continuation-in-part of U.S. patent U.S. Patent no. 5,871,506 filed August 19, 1996 (herein, the '506 Patent). The applications giving rise to the patents in the priority chain of the present application have been incorporated by reference into the application, in their entirety, for all purposes. Additionally, the priority claim of the '235 Patent claims priority from the '019 Patent. The priority claim of the '019 Patent claims priority from the '506 Patent.

Applicant will prevail on priority under 37 C.F.R. 41.202(a)(4) since Applicant's claims can claim an earlier priority date of August 19, 1996, whereas the earliest possible priority date that can be claimed in the patents is September 16, 1996. **Attachment P** demonstrates continuous support for the claims of the present application through the priority chain in accordance with 37 CFR §§41.202(a)(5) and (a)(6).

F. Proposed Count 4 for Interference

In accordance with 37 C.F.R. § 41.202(a)(2), Applicant proposes the following Count 4 directed to creating a non-excitatory electric potential between points located in the vicinity of a muscle:

COUNT 4

A method for varying contraction force of a muscle, comprising:

causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle; and

controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points,

wherein the non-excitatory electric current is a DC current; and

wherein the flow of the non-excitatory DC electric current is synchronized to heart activity.

F.1. Correspondence of Patent Claims to Proposed Count 4

In accordance with 37 C.F.R. § 41.202(a)(2), Applicant identifies that claim 12 of the '484 Patent corresponds to proposed Count 4. This correspondence is explained as follows.

Dependent claim 12 of the '484 Patent corresponds closely to proposed Count 4, with "reducing" in the preamble instead of "varying." Reducing is an obvious subset of varying. Note that for "DC current" in claim 12 to have proper antecedent basis, it inherently must depend on claim 10 and not claim 8.

The correspondence of independent claim 12 of the '484 Patent to proposed Count 4 is set out in tabular form in **Attachment G**.

F.2. Correspondence of Application Claims to Proposed Count 4

In accordance with 37 C.F.R. § 41.202(a)(2), Applicant identifies that claim 22 of this application corresponds to proposed Count 4. This correspondence is explained as follows.

Dependent claim 22 of the present application corresponds closely to proposed Count 4, with the preamble reciting variation of "conduction velocity" instead of "muscle contraction." Conduction velocity is intimately linked with contraction force of a muscle. The dependent claim 22 further includes a limitation from claim 18 wherein the non-excitatory current flows "as a first phase of a bi-phasic stimulation pulse."

The correspondence of independent claims 22 of the present application to proposed Count 4 is set out in tabular form in **Attachment H**.

F.3. Comparison to Show Interference in Accordance with 37 CFR 41.202(a)(3)

Attachment N sets forth the required comparisons to show Interference in accordance with 37 CFR 41.202(a)(3).

F.4. Applicant will Prevail on Priority

This application is a continuation of U.S. Patent no. 6,341,235 (herein, the '235 Patent) filed October 18, 2000, which is a continuation-in-part of U.S. Patent no. 6,136,019 (herein, the '019 Patent) filed January 16, 1998, which is a continuation-in-part of U.S. patent U.S. Patent no. 5,871,506 filed August 19, 1996 (herein, the '506 Patent). The applications giving rise to the patents in the priority chain of the present application have been incorporated by reference into the application, in their entirety, for all purposes. Additionally, the priority claim of the '235 Patent claims priority from the '019 Patent. The priority claim of the '019 Patent claims priority from the '506 Patent.

Applicant will prevail on priority under 37 C.F.R. 41.202(a)(4) since Applicant's claims can claim an earlier priority date of August 19, 1996, whereas the earliest possible priority date that can be claimed in the patents is September 16, 1996. **Attachment P** demonstrates continuous support for the claims of the present application through the priority chain in accordance with 37 CFR §§41.202(a)(5) and (a)(6).

G. Proposed Count 5 for Interference

In accordance with 37 C.F.R. § 41.202(a)(2), Applicant proposes the following Count 5 directed to creating a non-excitatory electric potential between points located in the vicinity of a muscle:

COUNT 5

Apparatus for heart pacing with cardiac output modification, comprising:

one or more electrodes adapted to apply electrical signals to cardiac muscle segments;

signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and

at least one sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.

G.1. Correspondence of Patent Claims to Proposed Count 5

In accordance with 37 C.F.R. § 41.202(a)(2), Applicant identifies that claims 2-5 of the '324 Patent correspond to proposed Count 5. This correspondence is explained as follows.

Independent claims 2-5 of the '324 Patent correspond to proposed Count 5, although they are not exact duplicates thereof.

The only difference between independent claim 2 of the '324 Patent and proposed Count 5 is that the claim recites specifically a "pressure sensor which senses cardiac activity," whereas the proposed Count broadly describes a "sensor which senses cardiac activity." A wide range of sensors was known in the art at the time this invention was made that are useful for the purpose of sensing cardiac activity. Selecting one of these known sensors, such as a pressure sensor, is not a choice of patentable distinction.

The only difference between independent claim 3 of the '324 Patent and proposed Count 5 is that the claim recites specifically a "flow rate sensor which senses cardiac activity," whereas the proposed Count broadly describes a "sensor which senses cardiac activity." A wide range of sensors was known in the art at the time this invention was made that are useful for the purpose of sensing cardiac activity. Selecting one of these known sensors, such as a flow rate sensor, is not a choice of patentable distinction.

The only difference between independent claim 4 of the '324 Patent and proposed Count 5 is that the claim recites specifically a "oxygen sensor which senses cardiac activity," whereas the proposed Count broadly describes a "sensor which senses cardiac activity." A wide range of sensors was known in the art at the time this invention was made that are useful for the purpose of sensing cardiac activity. Selecting one of these known sensors, such as an oxygen sensor, is not a choice of patentable distinction.

The only difference between independent claim 5 of the '324 Patent and proposed Count 5 is that the claim recites specifically a "temperature sensor which senses cardiac activity,"

whereas the proposed Count broadly describes a "sensor which senses cardiac activity." A wide range of sensors was known in the art at the time this invention was made that are useful for the purpose of sensing cardiac activity. Selecting one of these known sensors, such as a temperature sensor, is not a choice of patentable distinction.

The correspondence of independent claims 2-5 of the '324 Patent to proposed Count 5 is set out in tabular form in **Attachment J**.

G.2. Correspondence of Application Claims to Proposed Count 5

In accordance with 37 C.F.R. § 41.202(a)(2), Applicant identifies that claim 58-60 of this application correspond to proposed Count 5. This correspondence is explained as follows.

Independent claim 59 of the present application corresponds to proposed Count 5. It differs in that the non-excitatory pulse is anodal and is applied "as a first phase of a bi-phasic pacing pulse."

Independent claims 58 and 60 of the present application also correspond to proposed Count 5, although they are not exact duplicates thereof.

Claim 58 differs in that the non-excitatory pulse is anodal and is applied "as a first phase of a bi-phasic pacing pulse." Another difference between independent claim 58 of the present application and proposed Count 5 is that the claim recites specifically a "pressure sensor which senses cardiac activity," whereas the proposed Count broadly describes a "sensor which senses cardiac activity." A wide range of sensors was known in the art at the time this invention was made that are useful for the purpose of sensing cardiac activity. Selecting one of these known sensors, such as a pressure sensor, is not a choice of patentable distinction.

Claim 60 differs in that the non-excitatory pulse is anodal and is applied "as a first phase of a bi-phasic pacing pulse, the non-excitatory anodal stimulation pulse being." Another difference between independent claim 60 of the present application and proposed Count 5 is that the claim recites specifically a "oxygen sensor which senses cardiac activity," whereas the proposed Count broadly describes a "sensor which senses cardiac activity." A wide range of sensors was known in the art at the time this invention was made that are useful for the purpose

of sensing cardiac activity. Selecting one of these known sensors, such as an oxygen sensor, is not a choice of patentable distinction.

The correspondence of independent claims 58-60 of the present application to proposed Count 5 is set out in tabular form in **Attachment K**.

G.3. Comparison to Show Interference in Accordance with 37 CFR 41.202(a)(3)

Attachment N sets forth the required comparisons to show Interference in accordance with 37 CFR 41.202(a)(3).

G.4. Applicant will Prevail on Priority

This application is a continuation of U.S. Patent no. 6,341,235 (herein, the '235 Patent) filed October 18, 2000, which is a continuation-in-part of U.S. Patent no. 6,136,019 (herein, the '019 Patent) filed January 16, 1998, which is a continuation-in-part of U.S. patent U.S. Patent no. 5,871,506 filed August 19, 1996 (herein, the '506 Patent). The applications giving rise to the patents in the priority chain of the present application have been incorporated by reference into the application, in their entirety, for all purposes. Additionally, the priority claim of the '235 Patent claims priority from the '019 Patent. The priority claim of the '019 Patent claims priority from the '506 Patent.

Applicant will prevail on priority under 37 C.F.R. 41.202(a)(4) since Applicant's claims can claim an earlier priority date of August 19, 1996, whereas the earliest possible priority date that can be claimed in the patents is September 16, 1996. **Attachment P** demonstrates continuous support for the claims of the present application through the priority chain in accordance with 37 CFR §§41.202(a)(5) and (a)(6).

H. Proposed Count 6 for Interference

In accordance with 37 C.F.R. § 41.202(a)(2), Applicant proposes the following Count 6 directed to creating a method for heart pacing:

COUNT 6

A method for heart pacing with modification of cardiac contraction, comprising the steps of:

(a) fixing at least one electrode to tissue of a subject's heart;

(b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and

(c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.

H.1. Correspondence of Patent Claims to Proposed Count 6

In accordance with 37 C.F.R. § 41.202(a)(2), Applicant identifies that claims 8-10 of the '324 Patent corresponds to proposed Count 6. This correspondence is explained as follows.

Independent claims 8-10 of the '324 Patent correspond to proposed Count 6, although they are not exact duplicates thereof.

The only difference between claim 8 of the '324 Patent and proposed Count 6 is that proposed Count 6 recites the step:

(a) fixing at least one electrode to tissue of a subject's heart;

whereas claim 8 of the '324 Patent recites the steps:

(a) implanting a pacing electrode in a first chamber of a subject's heart;

(b) implanting a non-excitatory stimulation electrode in another chamber of the subject's heart.

The single step recitation of the proposed Count and the two step recitation of the patented claim have the same essential meaning and are simply expressed in a different form of words. Although the single step phrasing only explicitly recites one electrode, simple physics dictates that a second electrode be present in order for a closed loop of current to flow through the tissue. Thus, these two phrasings are a difference without distinction.

The only difference between claim 9 of the '324 Patent and proposed Count 6 is that proposed Count 6 recites the step:

(a) fixing at least one electrode to tissue of a subject's heart;

whereas claim 9 of the '324 Patent recites the step:

(a) implanting at least one non-excitatory stimulation electrode in each of a plurality of chambers of a subject's heart;

These two method step descriptions have the same essential meaning and are simply expressed in a different form of words. Any difference is without distinction. The choice of placement of electrodes is well within the skill of persons of skill in the surgical art.

The only difference between claim 10 of the '324 Patent and proposed Count 6 is that proposed Count 6 recites the step:

(a) fixing at least one electrode to tissue of a subject's heart;

whereas claim 10 of the '324 Patent recites the step:

(a) fixing at least one electrode to the epicardium of a subject's heart;

These two method step descriptions have the same essential meaning and are simply expressed in a different form of words. Any difference is without distinction. The choice of placement of electrodes is well within the skill of persons of skill in the surgical art.

The correspondence of independent claims 8-10 of the '324 Patent to proposed Count 6 is set out in tabular form in **Attachment L**.

H.2. Correspondence of Application Claims to Proposed Count 6

In accordance with 37 C.F.R. § 41.202(a)(2), Applicant identifies that claims 61-63 of this application correspond to proposed Count 6. This correspondence is explained as follows.

Independent claims 61-63 of the present application correspond to proposed Count 6, although they are not exact duplicates thereof. A difference in all three claims is the inclusion of the limitation that the non-excitatory pulse is anodal and is applied "as a first phase of a bi-phasic pacing pulse."

The only other difference between claim 61 of the present application and proposed Count 6 is that proposed Count 6 recites the step:

(a) fixing at least one electrode to tissue of a subject's heart;

whereas claim 61 of the present application recites the steps:

(a) implanting a pacing electrode in a first chamber of a subject's heart;

(b) implanting a non-excitatory stimulation electrode in another chamber of the subject's heart.

The single step recitation of the proposed Count and the two step recitation of the patented claim have the same essential meaning and are simply expressed in a different form of words. Although the single step phrasing only explicitly recites one electrode, simple physics dictates that a second electrode be present in order for a closed loop of current to flow through the tissue. Thus, these two phrasings are a difference without distinction.

The only other difference between claim 62 of the present application and proposed Count 6 is that proposed Count 6 recites the step:

(a) fixing at least one electrode to tissue of a subject's heart;

whereas claim 62 of the present application recites the step:

(a) implanting at least one non-excitatory stimulation electrode in each of a plurality of chambers of a subject's heart;

These two method step descriptions have the same essential meaning and are simply expressed in a different form of words. Any difference is without distinction. The choice of placement of electrodes is well within the skill of persons of skill in the surgical art.

The only other difference between claim 63 of the present application and proposed Count 6 is that proposed Count 6 recites the step:

(a) fixing at least one electrode to tissue of a subject's heart;

whereas claim 63 of the present application recites the step:

(a) fixing at least one electrode to the epicardium of a subject's heart;

These two method step descriptions have the same essential meaning and are simply expressed in a different form of words. Any difference is without distinction. The choice of placement of electrodes is well within the skill of persons of skill in the surgical art.

The correspondence of independent claims 61-63 of the present application to proposed Count 6 is set out in tabular form in **Attachment M**.

H.3. Comparison to Show Interference in Accordance with 37 CFR 41.202(a)(3)

Attachment N sets forth the required comparisons to show Interference in accordance with 37 CFR 41.202(a)(3).

H.4. Applicant will Prevail on Priority

This application is a continuation of U.S. Patent no. 6,341,235 (herein, the '235 Patent) filed October 18, 2000, which is a continuation-in-part of U.S. Patent no. 6,136,019 (herein, the '019 Patent) filed January 16, 1998, which is a continuation-in-part of U.S. patent U.S. Patent no. 5,871,506 filed August 19, 1996 (herein, the '506 Patent). The applications giving rise to the patents in the priority chain of the present application have been incorporated by reference into the application, in their entirety, for all purposes. Additionally, the priority claim of the '235 Patent claims priority from the '019 Patent. The priority claim of the '019 Patent claims priority from the '506 Patent.

Applicant will prevail on priority under 37 C.F.R. 41.202(a)(4) since Applicant's claims can claim an earlier priority date of August 19, 1996, whereas the earliest possible priority date that can be claimed in the patents is September 16, 1996. **Attachment P** demonstrates continuous support for the claims of the present application through the priority chain in accordance with 37 CFR §§41.202(a)(5) and (a)(6).

K. Support for Claims of Application

In accordance with 37 C.F.R. §§ 41.202(a)(5) and (a)(6), **Attachment P** demonstrates continuous support for the claims of the present application through the priority chain.

L. Conclusion

For the above reasons, Applicant respectfully submits that it is appropriate for the Examiner to declare an interference between the present application and U.S. Patent Nos. 6,233,484 and 6,463,324. Early notice of such is respectfully requested.

Respectfully Submitted,

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Attachment A

PROPOSED COUNT 1	CLAIM 1 OF '484 PATENT
Apparatus comprising	Apparatus comprising
circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, and	circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of a muscle, comprising
comprising circuitry for controlling the start time and/or duration of the electric current flowing between said at least two points which is synchronized to heart activity,	circuitry for controlling the start time and/or the duration of the electric potential generated between said at least two points which is synchronized to heart activity,
said circuitry not operating at every beat of the heart.	said circuitry not operating at every beat of the heart.

PROPOSED COUNT 1	CLAIM 4 OF '484 PATENT
Apparatus comprising	Apparatus for selectively and reversibly reducing the oxygen consumption of an area of a muscle, comprising
circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, and	circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, and
comprising circuitry for controlling the start time and/or duration of the electric current flowing between said at least two points which is synchronized to heart activity,	comprising circuitry for controlling the start time and/or duration of the electric current flowing between said at least two points which is synchronized to heart activity,
said circuitry not operating at every beat of the heart.	said circuitry not operating at every beat of the heart.

PROPOSED COUNT 1	CLAIM 46 OF '484 PATENT
Apparatus comprising	Apparatus for performing heart surgery, comprising
circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, and	circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the heart muscle and
comprising circuitry for controlling the start time and/or duration of the electric current flowing between said at least two points which is synchronized to heart activity,	circuitry for controlling the start time and/or duration of the electric current flowing between said at least two points which is synchronized to heart activity,
said circuitry not operating at every beat of the heart.	wherein said circuitry for controlling does not operate at every beat of the heart.

PROPOSED COUNT 1	CLAIM 47 OF '484 PATENT
Apparatus comprising	Apparatus for promoting the healing of the hibernated area of the cardiac muscle after myocardial infarct, comprising
circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, and	circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, comprising
comprising circuitry for controlling the start time and/or duration of the electric current flowing between said at least two points which is synchronized to heart activity,	circuitry for controlling the start time and/or duration of the electric current flowing between said at least two points which is synchronized to heart activity,
said circuitry not operating at every beat of the heart.	said circuitry not operating at every beat of the heart.

PROPOSED COUNT 1	CLAIM 48 OF '484 PATENT
Apparatus comprising	Apparatus for promoting the healing of an ischmeic area of the cardiac muscle, comprising
circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, and	circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, comprising
comprising circuitry for controlling the start time and/or duration of the electric current flowing between said at least two points which is synchronized to heart activity,	circuitry for controlling the start and/or duration of the electric current flowing between said at least two points which is synchronized to heart activity,
said circuitry not operating at every beat of the heart.	said circuit not operating at every beat of the heart.

PROPOSED COUNT 1	CLAIM 49 OF '484 PATENT
Apparatus comprising	Apparatus for treating congenital or acquired hypertrophic cardiomyopathy, comprising
circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, and	circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, comprising
comprising circuitry for controlling the start time and/or duration of the electric current flowing between said at least two points which is synchronized to heart activity,	circuitry for controlling the start time and/or duration of the electric current flowing between said at least two points which is synchronized to heart activity,
said circuitry not operating at every beat of the heart.	said current not operating at every beat of the heart.

PROPOSED COUNT 1	CLAIM 50 OF '484 PATENT
Apparatus comprising	Apparatus for aiding in performing cardiac ablation, comprising
circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, and	circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, comprising
comprising circuitry for controlling the start time and/or duration of the electric current flowing between said at least two points which is synchronized to heart activity,	circuitry for controlling the start time and/or duration of the electric current flowing between said at least two points which is synchronized to heart activity,
said circuitry not operating at every beat of the heart.	said circuitry not operating at every beat of the heart.

Attachment B

PROPOSED COUNT 1	CLAIM 12 OF '750 APPLICATION
Apparatus comprising	Apparatus comprising
circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, and	circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of a muscle, comprising
comprising circuitry for controlling the start time and/or duration of the electric current flowing between said at least two points which is synchronized to heart activity,	circuitry for controlling the start time and/or the duration of the electric potential generated between said at least two points which is synchronized to heart activity,
said circuitry not operating at every beat of the heart.	said non-excitatory electric potential being a first phase of a bi-phasic pacing pulse.

PROPOSED COUNT 1	CLAIM 14 OF '750 APPLICATION
Apparatus comprising	Apparatus for selectively and reversibly reducing the oxygen consumption of an area of a muscle, comprising
circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, and	circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, and
comprising circuitry for controlling the start time and/or duration of the electric current flowing between said at least two points which is synchronized to heart activity,	comprising circuitry for controlling the start time and/or duration of the electric current flowing between said at least two points which is synchronized to heart activity,
said circuitry not operating at every beat of the heart.	said non-excitatory electric potential being a first phase of a bi-phasic pacing pulse.

Attachment C

PROPOSED COUNT 2	**'484 CLAIM 2**
Implantable apparatus comprising	Implantable apparatus comprising
circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, and	circuitry for causing a non-excitatory electric current to flow between at least two points located in the vicinity of a muscle and
circuitry for controlling the start time and/or duration of the electric current,	circuitry for controlling the start time and/or duration of the electric current,
wherein said circuitry for controlling does not operate at every beat of the heart.	wherein said circuitry for controlling does not operate at every beat of the heart.

Attachment D

PROPOSED COUNT 2	CLAIM 13 OF '750 APPLICATION
Implantable apparatus comprising	Implantable apparatus comprising
circuitry for causing a non-excitatory electric current to flow between at least two points located in the vicinity of a muscle and	circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of a muscle and
circuitry for controlling the start time and/or duration of the electric current,	circuitry for controlling the start time and/or duration of the electric current,
wherein said circuitry for controlling does not operate at every beat of the heart.	wherein said non-excitatory electric current is a first phase of a bi-phasic pacing pulse.

Attachment E

PROPOSED COUNT 3	CLAIM 8 OF '484 PATENT
A method for varying the contraction force of a muscle comprising	A method for reducing the contraction force of a muscle, comprising
causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and	causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and
controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points.	controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points.

PROPOSED COUNT 3	CLAIM 16 OF '484 PATENT
A method for varying the contraction force of a muscle comprising	A method for performing heart surgery, comprising
causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and	reducing the contraction force of a treated area of the cardiac muscle, by causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and
controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points.	controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points, thereby to obtain the desired reduction in muscle contraction at the treated heart area and
--	thereafter performing surgery thereon.

PROPOSED COUNT 3	CLAIM 20 OF '484 PATENT
A method for varying the contraction force of a muscle comprising	A method for promoting the healing of the cardiac muscle after myocardial infarct, comprising
causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and	causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and
controlling one or more of the parameters consisting of start time, duration, magnitude	controlling one or more of the parameters consisting of start time, duration, magnitude

PROPOSED COUNT 3	CLAIM 20 OF '484 PATENT
and polarity of the non-excitatory electric current flowing between said at least two points.	and polarity of the non-excitatory electric current flowing between said at least two points, said electric current being of an intensity and polarity suitable to obtain the desired reduction in muscle contraction at the affected heart area.

PROPOSED COUNT 3	CLAIM 21 OF '484 PATENT
A method for varying the contraction force of a muscle comprising	A method for selectively and reversibly reducing the oxygen consumption of an area of a muscle, comprising
causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and	causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and
controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points.	controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points, said electric current being of an intensity and polarity suitable to obtain the desired reduction in oxygen consumption at the affected heart area.

PROPOSED COUNT 3	CLAIM 24 OF '484 PATENT
A method for varying the contraction force of a muscle comprising	A method for treating congenital or acquired hypertrophic cardiomyopathy, comprising
causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and	reducing the contraction force of the heart muscle by causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and
controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points.	controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points, said electric current being of an intensity and polarity suitable to obtain the desired reduction in muscle contraction.

PROPOSED COUNT 3	CLAIM 26 OF '484 PATENT
A method for varying the contraction force of a muscle comprising	A method for performing cardiac ablation, comprising
causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and	reducing the contraction force of the area of the cardiac muscle to be ablated, by causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and
controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points.	controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points, thereby to obtain the desired reduction in muscle contraction at the heart area to be ablated, and
--	thereafter performing the ablation thereon.

Attachment F

PROPOSED COUNT 3	CLAIM 18 OF '750 APPLICATION
A method for varying the contraction force of a muscle comprising	A method for reducing the contraction force of a muscle, comprising
causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and	causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and
controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points.	controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points.

Attachment G

PROPOSED COUNT 4	CLAIM 12 OF '484 PATENT
A method for varying the contraction force of a muscle comprising	A method for reducing the contraction force of a muscle, comprising
causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and	causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and
controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points,	controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points;
wherein the non-excitatory electric current is a DC current; and	wherein the non-excitatory electric current is a DC current; and
wherein the flow of the non-excitatory DC electric current is synchronized to heart activity.	wherein the flow of the non-excitatory DC electric current is synchronized to heart activity.

Attachment H

PROPOSED COUNT 4	CLAIM 22 OF '750 APPLICATION
A method for varying the contraction force of a muscle comprising	A method for varying conduction velocity of a muscle, comprising
causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and	causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle as a first phase of a bi-phasic stimulation pulse, and
controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points,	controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points;
wherein the non-excitatory electric current is a DC current; and	wherein the non-excitatory electric current is a DC current; and
wherein the flow of the non-excitatory DC electric current is synchronized to heart activity.	wherein the flow of the non-excitatory DC electric current is synchronized to heart activity.

Attachment J

PROPOSED COUNT 5	CLAIM 2 OF '324 PATENT
Apparatus for heart pacing with cardiac output modification, comprising:	Apparatus for heart pacing with cardiac output modification, comprising:
one or more electrodes adapted to apply electrical signals to cardiac muscle segments;	one or more electrodes adapted to apply electrical signals to cardiac muscle segments;
signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and	signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and
at least one sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.	at least one pressure sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.

PROPOSED COUNT 5	CLAIM 3 OF '324 PATENT
Apparatus for heart pacing with cardiac output modification, comprising:	Apparatus for heart pacing with cardiac output modification, comprising:
one or more electrodes adapted to apply electrical signals to cardiac muscle segments;	one or more electrodes adapted to apply electrical signals to cardiac muscle segments;
signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and	signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and
at least one sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.	at least one flow rate sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.

PROPOSED COUNT 5	CLAIM 4 OF '324 PATENT
Apparatus for heart pacing with cardiac output modification, comprising:	Apparatus for heart pacing with cardiac output modification, comprising:
one or more electrodes adapted to apply electrical signals to cardiac muscle segments;	one or more electrodes adapted to apply electrical signals to cardiac muscle segments;
signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and	signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and
at least one sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.	at least one oxygen sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.

PROPOSED COUNT 5	CLAIM 5 OF '324 PATENT
Apparatus for heart pacing with cardiac output modification, comprising:	Apparatus for heart pacing with cardiac output modification, comprising:
one or more electrodes adapted to apply electrical signals to cardiac muscle segments;	one or more electrodes adapted to apply electrical signals to cardiac muscle segments;
signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and	signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and
at least one sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.	at least one temperature sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.

Attachment K

PROPOSED COUNT 5	CLAIM 58 OF '750 APPLICATION
Apparatus for heart pacing with cardiac output modification, comprising:	Apparatus for heart pacing with cardiac output modification, comprising:
one or more electrodes adapted to apply electrical signals to cardiac muscle segments;	one or more electrodes adapted to apply electrical signals to cardiac muscle segments;
signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and	signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory anodal stimulation pulse as a first phase of a bi-phasic pacing pulse, the non-excitatory anodal stimulation pulse being of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and
at least one sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.	at least one pressure sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.

PROPOSED COUNT 5	CLAIM 59 OF '750 APPLICATION
Apparatus for heart pacing with cardiac output modification, comprising:	Apparatus for heart pacing with cardiac output modification, comprising:
one or more electrodes adapted to apply electrical signals to cardiac muscle segments;	one or more electrodes adapted to apply electrical signals to cardiac muscle segments;
signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and	signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory anodal stimulation pulse as a first phase of a bi-phasic pacing pulse, the non-excitatory anodal stimulation pulse being of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and
at least one sensor which senses cardiac	at least one sensor which senses cardiac

PROPOSED COUNT 5	CLAIM 59 OF '750 APPLICATION
activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.	activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.

PROPOSED COUNT 5	CLAIM 60 OF '750 APPLICATION
Apparatus for heart pacing with cardiac output modification, comprising:	Apparatus for heart pacing with cardiac output modification, comprising:
one or more electrodes adapted to apply electrical signals to cardiac muscle segments;	one or more electrodes adapted to apply electrical signals to cardiac muscle segments;
signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and	signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory anodal stimulation pulse as a first phase of a bi-phasic pacing pulse, the non-excitatory anodal stimulation pulse being of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and
at least one sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.	at least one oxygen sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.

Attachment L

PROPOSED COUNT 6	CLAIM 8 OF '324 PATENT
A method for heart pacing with modification of cardiac contraction, comprising the steps of:	A method for heart pacing with modification of cardiac contraction, comprising the steps of:
(a) fixing at least one electrode to tissue of a subject's heart;	(a) implanting a pacing electrode in a first chamber of a subject's heart; (b) implanting a non-excitatory stimulation electrode in another chamber of the subject's heart;
(b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and	(c) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and
(c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.	(d) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.

PROPOSED COUNT 6	CLAIM 9 OF '324 PATENT
A method for heart pacing with modification of cardiac contraction, comprising the steps of:	A method for heart pacing with modification of cardiac contraction, comprising the steps of:
(a) fixing at least one electrode to tissue of a subject's heart;	(a) implanting at least one non-excitatory stimulation electrode in each of a plurality of chambers of a subject's heart;
(b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and	(b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and
(c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.	(c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.

PROPOSED COUNT 6	CLAIM 10 OF '324 PATENT
A method for heart pacing with modification of cardiac contraction, comprising the steps of:	A method for heart pacing with modification of cardiac contraction, comprising the steps of:
(a) fixing at least one electrode to tissue of a	(a) fixing at least one electrode to the

PROPOSED COUNT 6	CLAIM 10 OF '324 PATENT
subject's heart;	epicardium of a subject's heart;
(b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and	(b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and
(c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.	(c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.

Attachment M

PROPOSED COUNT 6	CLAIM 61 OF '750 APPLICATION
A method for heart pacing with modification of cardiac contraction, comprising the steps of:	A method for heart pacing with modification of cardiac contraction, comprising the steps of:
(a) fixing at least one electrode to tissue of a subject's heart;	(a) implanting a pacing electrode in a first chamber of a subject's heart; (b) implanting a non-excitatory stimulation electrode in another chamber of the subject's heart;
(b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and	(c) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and
(c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.	(d) conveying a non-excitatory stimulation pulse as a first phase of a bi-phasic pacing pulse, the non-excitatory anodal stimulation pulse being of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.

PROPOSED COUNT 6	CLAIM 62 OF '750 APPLICATION
A method for heart pacing with modification of cardiac contraction, comprising the steps of:	A method for heart pacing with modification of cardiac contraction, comprising the steps of:
(a) fixing at least one electrode to tissue of a subject's heart;	(a) implanting at least one non-excitatory stimulation electrode in each of a plurality of chambers of a subject's heart;
(b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and	(b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and
(c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.	(c) conveying a non-excitatory stimulation pulse as a first phase of a bi-phasic pacing pulse, the non-excitatory anodal stimulation pulse being of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.

PROPOSED COUNT 6	CLAIM 63 OF '750 APPLICATION
A method for heart pacing with modification of cardiac contraction, comprising the steps of:	A method for heart pacing with modification of cardiac contraction, comprising the steps of:
(a) fixing at least one electrode to tissue of a subject's heart;	(a) fixing at least one electrode to the epicardium of a subject's heart;
(b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and	(b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and
(c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.	(c) conveying a non-excitatory stimulation pulse as a first phase of a bi-phasic pacing pulse, the non-excitatory anodal stimulation pulse being of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.

ATTACHMENT N
BASIS FOR INTERFERENCE UNDER 41.202(a)(3)

COUNT 1	Applicant's CLAIM 12	Basis For Interference	'484 CLAIM 1	Basis For Interference
Apparatus comprising circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, and comprising circuitry for controlling the start time and/or duration of the electric current flowing between said at least two points which is synchronized to heart activity, said circuitry not operating at every beat of the heart.	Apparatus comprising circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of a muscle, comprising circuitry for controlling the start time and/or the duration of the electric potential generated between said at least two points which is synchronized to heart activity, said non-excitatory electric potential being a first phase of a biphasic pacing pulse.	Differences between the count and the claim are obvious.	Apparatus comprising circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of a muscle, comprising circuitry for controlling the start time and/or the duration of the electric potential generated between said at least two points which is synchronized to heart activity, said circuitry not operating at every beat of the heart.	Count anticipates the claim.

COUNT 2	**Applicant's CLAIM 13**	**Basis For Interference**	**'484 CLAIM 2**	**Basis For Interference**
Implantable apparatus comprising circuitry for causing a non-excitatory electric current to flow between at least two points located in the vicinity of a muscle and circuitry for controlling the start time and/or duration of the electric current, wherein said circuitry for controlling does not operate at every beat of the heart.	Implantable apparatus comprising circuitry for causing a non-excitatory electric current to flow between at least two points located in the vicinity of a muscle and circuitry for controlling the start time and/or duration of the electric current, wherein said non-excitatory electric current is a first phase of a bi-phasic pacing pulse.	Differences between the count and the claim are obvious.	Implantable apparatus comprising circuitry for causing a non-excitatory electric current to flow between at least two points located in the vicinity of a muscle and circuitry for controlling the start time and/or duration of the electric current, wherein said circuitry for controlling does not operate at every beat of the heart.	Count anticipates the claim.

COUNT 3	**Applicant's CLAIM 18**	**Basis For Interference**	**'484 CLAIM 8**	**Basis For Interference**
A method for varying the contraction force of a muscle, comprising	A method for varying conduction velocity of a muscle, comprising	Differences between the count and the claim are obvious.	A method for reducing the contraction force of a muscle, comprising	The count anticipates the claim.
causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and	causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle as a first phase of a bi-phasic stimulation pulse, and		causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and	
controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points.	controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points.		controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points.	

COUNT 4	**Applicant's CLAIM 22**	**Basis For Interference**	**'484 CLAIM 12**	**Basis For Interference**
A method for varying contraction force of a muscle, comprising	A method for varying conduction velocity of a muscle, comprising	Differences between the count and the claim are obvious.	A method for reducing the contraction force of a muscle, comprising	Differences between the count and the claim are obvious.
causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and	causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle as a first phase of a bi-phasic stimulation pulse, and		causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and	
controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points,	controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points;		controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points;	
wherein the non-excitatory electric current is a DC current; and	wherein the non-excitatory electric current is a DC current; and		wherein the non-excitatory electric current is a DC current; and	
wherein the flow of the non-excitatory DC electric current is synchronized to heart activity.	wherein the flow of the non-excitatory DC electric current is synchronized to heart activity.		wherein the flow of the non-excitatory DC electric current is synchronized to heart activity.	

COUNT 5	**Applicant's CLAIM 59**	**Basis For Interference**	**'324 CLAIM 2**	**Basis For Interference**
Apparatus for heart pacing with cardiac output modification, comprising: one or more electrodes adapted to apply electrical signals to cardiac muscle segments; signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and at least one sensor which senses	Apparatus for heart pacing with cardiac output modification, comprising: one or more electrodes adapted to apply electrical signals to cardiac muscle segments; signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory anodal stimulation pulse as a first phase of a bi-phasic pacing pulse, the non-excitatory anodal stimulation pulse being of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and at least one sensor which senses	Differences between the count and the claim are obvious.	Apparatus for heart pacing with cardiac output modification, comprising: one or more electrodes adapted to apply electrical signals to cardiac muscle segments; signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and at least one pressure sensor	Count renders the claim obvious since sensor (pressure) is well known cardiac sensor.

cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.	cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.		which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.	

COUNT 6	**Applicant's CLAIM 63**	**Basis For Interference**	**'324 CLAIM 9**	**Basis For Interference**
A method for heart pacing with modification of cardiac contraction, comprising the steps of: (a) fixing at least one electrode to tissue of a subject's heart; (b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and (c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.	A method for heart pacing with modification of cardiac contraction, comprising the steps of: (a) fixing at least one electrode to the epicardium of a subject's heart; (b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and (c) conveying a non-excitatory anodal stimulation pulse as a first phase of a bi-phasic pacing pulse, the non-excitatory anodal stimulation pulse being of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.	Differences between the count and the claim are obvious.	A method for heart pacing with modification of cardiac contraction, comprising the steps of: (a) fixing at least one electrode to the epicardium of a subject's heart; (b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and (c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction	Differences between the count and the claim are obvious.

ATTACHMENT P
SUPPORT
37 C.F.R. §§41.202 (a)(5) and (a)(6)

This application is a continuation of U.S. Patent no. 6,341,235 (herein, the '235 Patent) filed October 18, 2000, which is a continuation-in-part of U.S. Patent no. 6,136,019 (herein, the '019 Patent) filed January 16, 1998, which is a continuation-in-part of U.S. patent U.S. Patent no. 5,871,506 filed August 19, 1996 (herein, the '506 Patent). The applications giving rise to the patents in the priority chain of the present application have been incorporated by reference into the application, in their entirety, for all purposes. Additionally, the priority claim of the '235 Patent claims priority from the '019 Patent. The priority claim of the '019 Patent claims priority from the '506 Patent.

CLAIM 12	**SUPPORT**
Apparatus comprising circuitry	Application: Pacemaker electronics needed to practice the method of the present invention are well known to those skilled in the art. Current pacemaker electronics are capable of being programmed to deliver a variety of pulses, including those disclosed herein. (Application, ¶0025.) Text disclosed in the '235 Patent at Col. 4, lines 28-32. Text disclosed in the '019 Patent at Col. 4, lines 25-19. Text disclosed in the '506 Patent at Col. 4, lines 22-26.
for creating a non-excitatory electric potential between at least two points located in the vicinity of a muscle,	Application: … the first phase of stimulation is an anodal pulse at maximum subthreshold amplitude for a long duration, ….(Application, ¶0025.) Electrical "current," disclosed in ¶¶ 005 and 0008 inherently requires an electric potential between two locations in order to flow. Text disclosed in the '235 Patent at Col. 4, lines

	45-47. Current described, for example, at Col. 1, lines 48-60. Text disclosed in the '019 Patent at Col. 4, lines 42-45. Current described, for example, at Col. 1, lines 44-56. Text disclosed in the '506 Patent at Col. 4, lines 14-16. Current described, for example, at Col. 1, lines 33-45.
comprising circuitry for controlling the start time and/or the duration of the electric potential generated between said at least two points which is synchronized to heart activity,	Application: ....each stimulation phase having a polarity, amplitude, shape and duration.... ....the first phase is administered over 200 milliseconds after completion of a cardiac beating/pumping cycle. (Application, ¶0025.) Text disclosed in the '235 Patent at Col. 4, lines 34-36 and lines 43-45. Text disclosed in the '019 Patent at Col. 4, lines 31-33 and lines 40-42. First part of text disclosed in the '506 Patent at Col. 4, lines 2-4. '506 Patent discloses, the first phase is administered over 200 milliseconds post heart beat." Col. 4, lines 11-12.
said non-excitatory electric potential being a first phase of a bi-phasic pacing pulse.	Application: The anodal stimulation component of biphasic electrical stimulation augments cardiac contractility by hyperpolarizing the tissue prior to excitation...." (Application, ¶0052.) Text disclosed in the '235 Patent at Col. 8, lines 18-21. Text disclosed in the '019 Patent at Col. 9, lines 48-51. Text disclosed in the '506 Patent at Col. , lines 62-65.

CLAIM 13	**SUPPORT**
Implantable apparatus comprising circuitry	Application: Pacemaker electronics needed to practice the method of the present invention are well known to those skilled in the art. Current pacemaker electronics are capable of being programmed to deliver a variety of pulses, including those disclosed herein. (Application, ¶0025.) Text disclosed in the '235 Patent at Col. 4, lines 28-32. Text disclosed in the '019 Patent at Col. 4, lines 25-19. Text disclosed in the '506 Patent at Col. 4, lines 22-26.
for causing a non-excitatory electric current to flow between at least two points located in the vicinity of a muscle and circuitry for controlling the start time and/or duration of the electric current,	Application: … the first phase of stimulation is an anodal pulse at maximum subthreshold amplitude for a long duration, ….(Application, ¶0025.) Electrical "current," disclosed in ¶¶0005 and 0008 inherently requires an electric potential between two locations in order to flow. Text disclosed in the '235 Patent at Col. 4, lines 45-47. Current described, for example, at Col. 1, lines 48-60. Text disclosed in the '019 Patent at Col. 4, lines 42-45. Current described, for example, at Col. 1, lines 44-56. Text disclosed in the '506 Patent at Col. 4, lines 14-16. Current described, for example, at Col. 1, lines 33-45.
wherein said non-excitatory electric current is a first phase of a bi-phasic pacing pulse.	Application: The anodal stimulation component of biphasic electrical stimulation augments cardiac contractility by hyperpolarizing the tissue prior to excitation…." (Application, ¶0052.)

	Text disclosed in the '235 Patent at Col. 8, lines 18-21. Text disclosed in the '019 Patent at Col. 9, lines 48-51. Text disclosed in the '506 Patent at Col. 7, lines 62-65.

CLAIM 14	**SUPPORT**
Apparatus	Application: Pacemaker electronics needed to practice the method of the present invention are well known to those skilled in the art. Current pacemaker electronics are capable of being programmed to deliver a variety of pulses, including those disclosed herein. (Application, ¶0025.) Text disclosed in the '235 Patent at Col. 4, lines 28-32. Text disclosed in the '019 Patent at Col. 4, lines 25-19. Text disclosed in the '506 Patent at Col. 4, lines 22-26.
for varying conduction velocity of a muscle,	Application: See variation of conduction velocity illustrated in Figure 6; See variation of conduction velocity illustrated in Figure 6 of the '235 Patent. See variation of conduction velocity illustrated in Figure 6 of the '019 Patent. See variation of conduction velocity illustrated in Figure 6 of the '506 Patent.
comprising circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle,	Application: Electrical "current," disclosed in ¶¶ 005 and 0008 inherently requires an electric potential between two locations in order to flow. … the first phase of stimulation is an anodal pulse at maximum subthreshold amplitude for a long duration, ….(Application, ¶0025.) Current described, for example, at Col. 1, lines 48-60. Text disclosed in the '235 Patent at Col. 4, lines 45-47.

	Current described, for example, at Col. 1, lines 44-56. Text disclosed in the '019 Patent at Col. 4, lines 42-45. Current described, for example, at Col. 1, lines 33-45. Text disclosed in the '506 Patent at Col. 4, lines 14-16.
and comprising circuitry for controlling the start time and/or duration of the electric current flowing between said at least two points which is synchronized to heart activity,	Application: ....each stimulation phase having a polarity, amplitude, shape and duration.... ....the first phase is administered over 200 milliseconds after completion of a cardiac beating/pumping cycle. (Application, ¶0025.) Text disclosed in the '235 Patent at Col. 4, lines 34-36 and lines 43-45. Text disclosed in the '019 Patent at Col. 4, lines 31-33 and lines 40-42. First part of text disclosed in the '506 Patent at Col. 4, lines 2-4. '506 Patent discloses, the first phase is administered over 200 milliseconds post heart beat." Col. 4, lines 11-12.
said non-excitatory electric potential being a first phase of a bi-phasic pacing pulse.	Application: The anodal stimulation component of biphasic electrical stimulation augments cardiac contractility by hyperpolarizing the tissue prior to excitation...." (Application, ¶0052.) Text disclosed in the '235 Patent at Col. 8, lines 18-21. Text disclosed in the '019 Patent at Col. 9, lines 48-51. Text disclosed in the '506 Patent at Col. 7, lines 62-65.

CLAIM 18	**SUPPORT**
A method for varying conduction velocity of a muscle,	Application: See variation of conduction velocity illustrated in Figure 6; See variation of conduction velocity illustrated in Figure 6 of the '235 Patent. See variation of conduction velocity illustrated in Figure 6 of the '019 Patent. See variation of conduction velocity illustrated in Figure 6 of the '506 Patent.
comprising causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle	Application: Electrical "current," disclosed in ¶¶ 005 and 0008 inherently requires an electric potential between two locations in order to flow. … the first phase of stimulation is an anodal pulse at maximum subthreshold amplitude for a long duration, ….(Application, ¶0025.) Current described, for example, at Col. 1, lines 48-60. Text disclosed in the '235 Patent at Col. 4, lines 45-47. Current described, for example, at Col. 1, lines 44-56. Text disclosed in the '019 Patent at Col. 4, lines 42-45. Current described, for example, at Col. 1, lines 33-45. Text disclosed in the '506 Patent at Col. 4, lines 14-16.
as a first phase of a bi-phasic stimulation pulse, and	The anodal stimulation component of biphasic electrical stimulation augments cardiac contractility by hyperpolarizing the tissue prior to excitation…." (Application, ¶0052.) Text disclosed in the '235 Patent at Col. 8, lines

	18-21. Text disclosed in the '019 Patent at Col. 9, lines 48-51. Text disclosed in the '506 Patent at Col. , lines 62-65.
controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points.	Application: ....each stimulation phase having a polarity, amplitude, shape and duration.... ....the first phase is administered over 200 milliseconds after completion of a cardiac beating/pumping cycle. (Application, ¶0025.) Text disclosed in the '235 Patent at Col. 4, lines 34-36 and lines 43-45. Text disclosed in the '019 Patent at Col. 4, lines 31-33 and lines 40-42. First part of text disclosed in the '506 Patent at Col. 4, lines 2-4. '506 Patent discloses, the first phase is administered over 200 milliseconds post heart beat." Col. 4, lines 11-12.

CLAIM 19	**SUPPORT**
A method according to claim 17 or 18, wherein the muscle is a cardiac muscle.	Application: In this fashion, pulse conduction through the cardiac muscle is improved…(Application, Abstract.) Text disclosed in the Abstract of the '235 Patent, except that the word "improved" is printed as "unproved." Text disclosed in the Abstract of the '019 Patent, except that the word "improved" is printed as "unproved." Text disclosed in the Abstract of the '506 Patent.

CLAIM 20	**SUPPORT**
A method according to claim 18, wherein the non-excitatory electric current is a DC current.	Application: Sometimes a patient suffering from a conduction disorder can be helped by an artificial pacemaker. Such a device contains a small battery powered electrical stimulator. (Application, ¶0007.) "Current flow" from a "small battery powered electrical stimulator" is inherently direct current ("DC"). Text disclosed in the '235 Patent at Col. 2, lines 1-3. Text disclosed in the '019 Patent at Col. 1, lines 64-66. Text disclosed in the '506 Patent at Col. 1, lines 53-55.

CLAIM 22	**SUPPORT**
A method according to claim 18, wherein the flow of the non-excitatory DC electric current is synchronized to heart activity.	Application: ...the first phase is administered over 200 milliseconds after completion of a cardiac beating/pumping cycle. (Application, ¶0025.) Text disclosed in the '235 Patent at Col. 4, lines 43-45. Text disclosed in the '019 Patent at Col. 4, lines 40-42. '506 Patent discloses, the first phase is administered over 200 milliseconds post heart beat." ('506 Patent, Col. 4, lines 11-12.)

CLAIM 58	SUPPORT
Apparatus for heart pacing with cardiac output modification, comprising:	Enhanced myocardial function is obtained through the biphasic pacing of the present invention. (pg. 3, para. 13).
one or more electrodes adapted to apply electrical signals to cardiac muscle segments;	The pacemaker 810 is coupled to a heart 812 by way of leads 814 and 816 (pg. 11, para. 46)
signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and	Signal generator control circuitry. (pgs. 11-12, para. 47)
at least one pressure sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.	Piezoelectric activity pressure sensor used for feedback control. (pg. 13, para. 51).

CLAIM 59	SUPPORT
Apparatus for heart pacing with cardiac output modification, comprising:	Enhanced myocardial function is obtained through the biphasic pacing of the present invention. (pg. 3, para. 13).
one or more electrodes adapted to apply electrical signals to cardiac muscle segments;	The pacemaker 810 is coupled to a heart 812 by way of leads 814 and 816 (pg. 11, para. 46)
signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and	Signal generator control circuitry. (pgs. 11-12, para. 47)
at least one sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.	Various sensors disclosed as being used for feedback control. (pg. 13, para. 51).

CLAIM 60	SUPPORT
Apparatus for heart pacing with cardiac output modification, comprising:	Enhanced myocardial function is obtained through the biphasic pacing of the present invention. (pg. 3, para. 13).
one or more electrodes adapted to apply electrical signals to cardiac muscle segments;	The pacemaker 810 is coupled to a heart 812 by way of leads 814 and 816 (pg. 11, para. 46)
signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and	Signal generator control circuitry. (pgs. 11-12, para. 47)
at least one oxygen sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.	Blood oxygenation sensor disclosed as being used for feedback control. (pg. 13, para. 51).

CLAIM 61	SUPPORT
A method for heart pacing with modification of cardiac contraction, comprising the steps of:	Enhanced myocardial function is obtained through the biphasic pacing of the present invention. (pg. 3, para. 13).
(a) implanting a pacing electrode in a first chamber of a subject's heart; (b) implanting a non-excitatory stimulation electrode in another chamber of the subject's heart;	The pacemaker 810 is coupled to a heart 812 by way of leads 814 and 816 (pg. 11, para. 46) Refer to Fig. 8 for placement disclosure.
(c) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and	The pacemaker 810 is coupled to a heart 812 by way of leads 814 and 816 (pg. 11, para. 46)
(d) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.	Signal generator control circuitry. (pgs. 11-12, para. 47)

CLAIM 62	SUPPORT
A method for heart pacing with modification of cardiac contraction, comprising the steps of:	Enhanced myocardial function is obtained through the biphasic pacing of the present invention. (pg. 3, para. 13).
(a) implanting at least one non-excitatory stimulation electrode in each of a plurality of chambers of a subject's heart;	The pacemaker 810 is coupled to a heart 812 by way of leads 814 and 816 (pg. 11, para. 46) Refer to Fig. 8 for placement disclosure.
(b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and	The pacemaker 810 is coupled to a heart 812 by way of leads 814 and 816 (pg. 11, para. 46)
(c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.	Signal generator control circuitry. (pgs. 11-12, para. 47)

CLAIM 63	SUPPORT
A method for heart pacing with modification of cardiac contraction, comprising the steps of:	Enhanced myocardial function is obtained through the biphasic pacing of the present invention. (pg. 3, para. 13).
(a) fixing at least one electrode to the epicardium of a subject's heart;	The pacemaker 810 is coupled to a heart 812 by way of leads 814 and 816 (pg. 11, para. 46) Refer to Fig. 8 for placement disclosure.
(b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and	The pacemaker 810 is coupled to a heart 812 by way of leads 814 and 816 (pg. 11, para. 46)
(c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.	Signal generator control circuitry. (pgs. 11-12, para. 47)

CLAIM 64	SUPPORT
A method for heart pacing with modification of cardiac contraction, comprising the steps of:	Enhanced myocardial function is obtained through the biphasic pacing of the present invention. (pg. 3, para. 13).
(a) applying one or more electrodes to a subject's heart;	The pacemaker 810 is coupled to a heart 812 by way of leads 814 and 816 (pg. 11, para. 46) Refer to Fig. 8 for placement disclosure.
(b) conveying an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart;	The pacemaker 810 is coupled to a heart 812 by way of leads 814 and 816 (pg. 11, para. 46)
(c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac contraction; and	Signal generator control circuitry. (pgs. 11-12, para. 47)
(d) applying a sensor which senses cardiac activity to the subject's body,	Various sensors disclosed. (pg. 13, para. 51).
wherein conveying the non-excitatory stimulation pulse comprises generating a pulse responsive to the activity.	The various sensors are disclosed as being used for feedback control. (pg. 13, para. 51).

CLAIM 65	SUPPORT
A method for heart pacing with modification of cardiac contraction, comprising the steps of:	Enhanced myocardial function is obtained through the biphasic pacing of the present invention. (pg. 3, para. 13).
(a) applying one or more electrodes to a subject's heart;	The pacemaker 810 is coupled to a heart 812 by way of leads 814 and 816 (pg. 11, para. 46) Refer to Fig. 8 for placement disclosure.
(b) conveying an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart;	The pacemaker 810 is coupled to a heart 812 by way of leads 814 and 816 (pg. 11, para. 46)
(c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac contraction; and	Signal generator control circuitry. (pgs. 11-12, para. 47)
(d) applying a pressure sensor which senses cardiac activity to the subject's body,	Piezoelectric activity pressure sensor. (pg. 13, para. 51).
wherein conveying the non-excitatory stimulation pulse comprises generating a pulse responsive to the activity.	The piezoelectric activity pressure sensor used for feedback control. (pg. 13, para. 51).

CLAIM 66	SUPPORT
A method for heart pacing with modification of cardiac contraction, comprising the steps of:	Enhanced myocardial function is obtained through the biphasic pacing of the present invention. (pg. 3, para. 13).
(a) applying one or more electrodes to a subject's heart;	The pacemaker 810 is coupled to a heart 812 by way of leads 814 and 816 (pg. 11, para. 46) Refer to Fig. 8 for placement disclosure.
(b) conveying an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart;	The pacemaker 810 is coupled to a heart 812 by way of leads 814 and 816 (pg. 11, para. 46)
(c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac contraction; and	Signal generator control circuitry. (pgs. 11-12, para. 47)
(d) applying an oxygen sensor which senses cardiac activity to the subject's body,	Blood oxygenation sensor. (pg. 13, para. 51).
wherein conveying the non-excitatory stimulation pulse comprises generating a pulse responsive to the activity.	The blood oxygenation sensor is disclosed as being used for feedback control. (pg. 13, para. 51).